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COURSE CODE: BIO 102

1. Classify plants according to Eichlers grouping of 1883.

ANSWERS

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| **DIVISION** | **CLASS** |
| Thallophyta | Phycotinae(Algae)Mycotinae(Fungi) |
| Bryophyta | Hepaticae(Liverworts)Musci(Mosses) |
| Pteridophyta | Psilotinate(Psilotum)Lycopodinae(Lycopodium, Selaginella)Equisetinae(Horsetails)Filicinae(Ferns) |
| Spermophyta | Gymnospermae(GymnospermsAngiospermae(Angiosperms) |

1. How are algae of importance to man.

ANSWERS

1. Numerous cultures around the world consider algae as an important source of nourishment
2. Algae can be used as binding agent to bind soil together
3. In order for crops to be grown on Usar lands, the pH level must be lowered and the ability of the soil to hold onto water must be increased this process can be achieved using blue-green algae.
4. Large red and brown algae are used in the manufacture of fertilizer
5. The industry involved in the breeding and farming of fish, also known as Pisiculture, also utilizes algae as parts of its production process
6. Algae can be found in house hold products such as toothpaste and other pharmaceuticals
7. Carrageenan which is a type of algae is often added to diary products such as cheese and sour cream in order to give them a denser texture.
8. Alginic acid which can be found in algae is used to stabilize foods such as milkshakes, malts and mayonnaise
9. Gelatin is used in the production of numerous edible products. In fact, this substance is made up of a type of algae known as agar. Gelatin acts to solidify liquids found in such popular products such as pie crusts and fillings.
10. By burning sea weeds on the sea coast, the alkalies are prepared from sea weed ashes. These alkalies are employed in the manufacture of soaps and alums.
11. Describe a unicellular from of algae

ANSWER

Chlamydomonas

Chlamydomonas is the name given to a genus of microscopic, unicellular green plants (algae) which live in fresh water. Typically their single-cell body is approximately spherical, about 0.02mm across, with a cell wall surrounding the cytoplasm and a central nucleus. Two filaments of cytoplasm, flagella, extend from one end, and their whip-like lashing pull the chlamydomonas through the water and rotate it at the same time. A single cup-shaped chloroplast occupies the greater part of the cell. In this chloroplast is a protein region called a pyrenoid, which is involved in starch production and is often surrounded by starch granules. A region of cytoplasm near the origin of the flagellais sensitive to light and associated with this is a red pigment spot whose shadow when cast on the sensitive area is thought to cause turning movement of the chlamydomonas and so bring it to the region where the intensity of the light is most suitable for it. In this anterior region are seen two spherical vacuoles which swell and collapse alternatively. These contractile vacuoles are concerned with the expulsion of excess water absorbed by osmosis. Chlamydomonas makes food in the same way as green plants but without the elaborate system of roots, stem and leaves of the higher plants. There is no special breathing organ present, the oxygen needed for respiration diffuses in from water through the entire body surface of the cell. Similarly, carbon dioxide diffuses in during photosynthesis.

1. How does this unicellular alga described in question 3 carry out its reproduction.

ANSWERS

ASEXUAL REPRODUCTION IN CHLAMYDOMONAS

The quality and quantity of genetic material in the mother cell is retained in the daughter cell, this is known as mitotic division. When a chlamydomonas want to undergo vegetative reproduction it first losses its flagella, then the nucleus and cytoplasm divide and two daughter cells or zoospores are formed.

SEXUAL REPRODUCTION IN CHLAMYDOMONAS

Sexual reproduction also occurs but when the condition is unfavourable e.g lack of nutrients, moisture e.t.c . The haploid daughter cells from gamete of two different mating strain (positive & negative).Opposite mating train then fuse together this process is called isogamy. The result of this is a diploid zygote which have two set of chromosome. The zygote remains dormant if the condition is unfavourable but when the condition becomes favourable it undergoes meiosis to produce four genetically unique haploid cells known as zoospores which later grow into mature cells.

1. Differentiate between the two types of colonial form of algae.

ANSWERS

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| PANDORINA | VOLVOX |
| Pandorina occurs in water bloom where the colony consists of 16 cells attached to one another | Volvox on the other hand shows more complex form than pandorina. It is also known as green colonial form an the cells in the colony may run into thousands and connected with cytoplasmic strands that runs through the cell |
| Sexual reproduction is anisogamous | Sexual reproduction is Oogamous |
| Unicellular motile thallus | Multicellular motile thallus |

1. Describe a named complex form of algae.

ANSWER

Fucus

Fucus is a genus of brown algae found in the intertidal zone of rocky seashores almost throughout the whole world. Fucus is also called rock weed. Fucus species, along with other kelp, are an important source of alginates-colloidal extract with many industrial uses similar to those of agar. Fucus are perennial algae, some of which have a life span of up to four years. The plants consist of a dichotomously-branched thallus which has a small stipe and a disk-shaped hold fast for clinging to rocks. It has a mucilage-covered blades which helps to resist desiccation and temperature changes, the blade usually has a local thickened area which is centrally placed called midrib. Air bladders are found in some species and those help to keep the plant afloat when submerged. There is conducting tissue in fucus: it is unnecessary as the plant is able to manufacture food locally. In these brown algae the plants are always diploid and meiosis takes place before the gametes are formed. Gamete production takes place in specialised crypt-like structure called conceptacles which are borne in fertile swollen areas at the tips of the plants: these are called receptacles. The male and female reproductive organs may occur on the same organism or on separate ones; some species produce eggs and sperm all year long The growth of the thallus is localised at the tips of forked shoots, and most species are between about 2 and 50cm in length. Fucus species are found in the upper mid and lower intertidal in the colder waters of the northern atlantic and northern pacific. Examples are;

*Fucus serratus*

*Fucus spiralis*

*Fucus vesiculosus*

*Fucus guiryi*